whilst on the other hand, winds charged with vapour would have but little effect; and a heavy fall of rain, particularly in equatorial parts of the Ocean, where the sea is so little disturbed, would very sensibly diminish it. It is also very sensibly less in the vicinity of the coast, particularly when the latter is of a shoal character, as is the case between the River Plate and the Strait of Magalhaens, where the whole extent is fronted by a bank having from 30 to 50 fathoms of water.

The mean specific gravity of the water of the South Pacific, contained between the parallels of 10° and 40°, is 1026·48, and between 40° and 60° it is 1026·13.

The results obtained by the author are then compared with the following, viz.—

Observations made on board the 'Hamlet' in 1849, during a voyage from Sydney to England.

Observations made on board the 'Thomas Arbuthnot' in 1849 and 1850, during a voyage from England to Sydney.

Specific gravities of specimens of water collected by Captain J. Elphinstone Erskine, R.N., of Her Majesty's Ship 'Havannah,' the Senior Officer on the Australian Station, during a visit to New Caledonia, the Loyalty Islands, and to those at the south-eastern end of the Solomon Islands.

Specific gravities of specimens of water collected by the late Captain Sir James Everard Home, Bart., R.N., C.B., of Her Majesty's Ship 'Calliope,' the successor of Captain Erskine in the command of the Station, who visited the Friendly and the Fidjee Islands.

Specific gravities of specimens of water collected by Mr. Simpson, who commanded a trading vessel between China and Sydney, from the Indian Ocean between the Strait of Sunda and the Latitude of 36° South.

II. "On the Existence of Silver in Sea-water." By Frederick Field, F.C.S. Communicated by Michael Faraday, Esq., D.C.L., F.R.S. &c. Received October 23, 1856.

In a paper first published by MM. Malaguti, Durocher, and Sarzeaud in the 'Annales de Chimie et de Physique,' xxviii. p. 129,

and translated in the Quarterly Journal of the Chem. Soc., vol. iii. p. 69, there is an account of the detection and estimation of silver in sea-water. The authors suspected the existence of the metal from the extensive diffusion of silver in the mineral kingdom, the conversion of its sulphide into chloride by the prolonged action of soluble bodies containing chlorine, and the solubility of chloride of silver in chloride of sodium. The method pursued was by passing sulphuretted hydrogen through large quantities of water, and also by fusing the salts obtained by evaporation with litharge and subsequent cupellation.

As a solution of chloride of silver in chloride of sodium is instantly decomposed by metallic copper, chloride of copper being formed and silver precipitated, it appeared to me highly probable that the copper and the yellow metal used in sheathing the hulls of vessels, must, after long exposure to sea-water, contain more silver than they did before having been exposed to its action, by decomposing chloride of silver in their passage through the sea, and depositing the metal on their surfaces. A large vessel, the 'Ana Guimaraens,' now under the Chilian flag, was hauled down in the Bay of Herradura, near Coquimbo, for the purpose of being repaired, and the captain obligingly furnished me with a few ounces of the yellow metal from the bottom of the vessel. The investigation was interesting, as the metal had been on for more than seven years (an unusually long period), and the ship had been trading up and down the Pacific Ocean all that time. The metal, upon examination, was found to be exceedingly brittle, and could be broken between the fingers with great ease. 5000 grs. were dissolved in pure nitric acid and the solution diluted; a few drops of hydrochloric acid were added, and the precipitate allowed to subside for three days. A large quantity of white insoluble matter had collected by that time at the bottom of the beaker. This was filtered off, dried, and fused with 100 grs. pure litharge and suitable proportions of bitartrate of potash and carbonate of soda, the ashes of the filter also being added. The resulting button of lead was subsequently cupelled, and yielded 2·01 grs. silver, or 1 lb. 1 oz. 2 dwts. 15 grs. troy per ton. This very large quantity could hardly be supposed to have existed in the original metal, as the value of the silver would be well worth the extraction. It is to be regretted that the captain had

none of the original on board. A piece of yellow metal with which he was repairing the vessel yielded only 0 oz. 18 dwts. to the ton. I was enabled by the courtesy of the captain of the 'Nina,' a brig which had just arrived in the Pacific from England, to obtain more satisfactory information. He gave me a piece of Muntz's yellow metal from his cabin, from the same lot with which the brig was sheathed, but which had never been in contact with salt water; and also a small portion from the hull of the ship after it had been on nearly three years. The experiments were performed as before, and the results were very striking.

grs.		gr.			oz.	dwts.	grs.	
1700	from cabin	gave ·051	= ·003	per cent.	= 0	19	14	per ton.
1700	from hull	„ ·400	= ·023	„	= 7	13	1	„ „

That which had been exposed to the sea having nearly eight times as much silver as the original sample.

Many other specimens were examined of metals from the bottoms of ships, and of pieces which are always kept on board in case of need, and it was invariably found that the former contained more silver than the latter. For instance, a piece from the hull of the 'Bergmann' gave 5 ozs. 16 dwts. 18 grs. per ton, while that from the cabin yielded 4 ozs. 6 dwts. 12 grs. 200 grs. from a piece from the hull of the 'Parga' gave ·072 gr., and a piece of fresh metal ·050; while from the 'Grasmere,' only coppered a few months, 610 grs. from the hull gave ·075 and from the cabin ·072,—a very slight difference indeed.

It will be observed that the amount of silver in the above specimens of fresh metal is very high, and it is probable that most of these are merely the re-rolling of masses of metal melted down from old sheathing, and have derived the greater part of their silver from the sea on former occasions. It is well known that the copper used in the manufacture of yellow metal is very pure, containing 2 or 3 dwts. of silver per ton, frequently not so much, and silver is very seldom associated with the other constituent, zinc. In order to arrive at more certain results, however, I have granulated some very pure copper, reserving some in a glass stoppered bottle, and suspended the remainder (about 10 ounces) in a wooden box perforated on all sides, a few feet under the surface of the Pacific Ocean. When occasion

offers, the box is towed by a line at the stern of a vessel which is trading up and down the coast of Chili. It is almost too soon to expect any decisive results at present, but in a few months I hope to be enabled to send both the original copper, and that which has been exposed to the action of the sea.

III. "On the Causes of the great Variation among the different Measures of the Earth's Mean Density." By Captain W. S. Jacob, Director of the Observatory at Madras. Communicated by the Rev. Baden Powell, F.R.S. Received October 25, 1856.

The result of the Pendulum experiments in the Harton Colliery, undertaken by the Astronomer Royal in 1854, and detailed in his paper presented to the Royal Society in January 1856, appears at first sight rather startling, as adding to the already somewhat discrepant measures or estimates of the earth's mean density one more discordant than ever; so that we have now values ranging from 4·7 to nearly 6·6; a range, which, in the absence of any sufficient ground for selecting any *one* as true to the exclusion of the rest, would seem to deprive us of all confidence in their correctness as *measures*, and leave them rather to be classed as *estimates* of a very rough description.

But it will be my endeavour to show, that, while none of the methods employed are capable of giving *strictly* accurate results, the Cavendish experiment is the one which may be relied on as giving a good approximation to the truth, within limits of error (when conducted with proper precaution) far less than those to which either of the other methods are liable.

The three principal methods which have been tried are,—1st, the *Schehallien* or *Huttonian*, which consists in comparing the total attraction of the earth with that of a mountain mass, by measuring astronomically the inclination of the normals at a given distance in the meridian-plane on each side of the mass; and then inferring the attraction of the mass from the difference of this inclination from what it would be on an exact spheroid; 2nd, the *Cavendish* experi-